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ABSTRACT

In 1986, the Florida State Legislature passed a law requiring teachers to demonstrate knowledge of their subject areas before being granted teacher certification. The state also provided funding for developing subject area examinations. The generic procedures for developing these examinations are outlined. During the first phase of the project, an Examination Development Committee (EDC) determined which competencies and skills teachers should have in their subject areas. The committee also recommended percentages of the examination to be allocated to each competency and skill. Using the specified competencies, test item specifications were formulated. The second phase of the project entailed the development, testing, and refinement of 480 test items. Once developed by the EDC, items were evaluated by a Validation Committee and external sources. Revised items were computer arranged into five examination forms and administered to first-year teachers and senior-level students enrolled in teacher preparation programs in the state of Florida. Results were analyzed statistically, and final revisions were made. Two tables present examination plans. (Author/SLD)

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DEVELOPMENT OF SUBJECT -AREA TEACHER CERTIFICATION EXAMINATIONS

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DEVELOPMENT OF A STATE TEACHER CERTIFICATION EXAM

ABSTRACT

In 1986, the Florida Legislature passed a law requiring teachers to demonstrate knowledge of their subject area before being granted teacher certification. Funding was provided to develop subject area examinations in each teaching specialization. In this paper, the generic procedures for developing these teacher certification subject area examinations are outlined.

During the first phase of the project an Examination Development Committee determined which competencies and skills teachers should have in their subject area. This committee also recommended percentages of the exam to be allocated to each competency and skill in a blueprint for exam construction. Using the specified competencies, test item specifications were formulated.

The second phase of the project entailed the development, testing and refinement of 480 test items. Once developed by the Examination Development Committee, items were evaluated by a Validation Committee and external sources. Revised items were computer arranged into five examination forms and administered to first-year teachers and senior-level students enrolled in teacher preparation programs in the state of Florida. Results were statistically analyzed and final revisions made.

INTRODUCTION

Since the publication of A Nation At Risk and the Holmes Report describing the inadequacy of public education in the United States, various state legislative bodies have proposed numerous changes in their requirements for teacher certification. This focus is reflective of the perception that quality teaching results in quality learning. Thus, adequately prepared teachers are essential if students are to learn.

Many of the legislative enactments have focused on influencing the curricula of teacher preparation programs or evaluating the product after completion of these programs. According to the April 20, 1988 Chronicle of Higher Education, since 1986 thirteen states have passed or enacted legislation requiring teachers to pass a state-developed subject area knowledge examination prior to being granted initial certification. Several other states use the National Teacher Examination or a combination of the two for this purpose.

In 1986 the Florida Legislature passed a law (Florida Statue #231.17) requiring that all teachers demonstrate knowledge in their subject area via examination prior to initial teacher certification. This certification criterion was one of several which also included passing a basic pedagogical exam and successfully completing a one-year Beginning Teacher program. Through these criteria, Florida was seeking to meet a goal set forth in 1986 publication Tomorrow's Teachers: A Report of the

Holmes Group, which dealt with the creation of "standards of entry to the teaching profession that are professionally relevant and intellectually defensible."

The purpose of this paper is to describe the procedural development of the subject area certification exams for teachers in the state of Florida. It is believed that this was the largest test development project to be conducted at one time by any state department of education. Forty-six subject area tests were developed simultaneously under contract to various state educational institutions. All subject area projects were conducted following the same general guidelines.

The test development process had two phases: Phase I consisted of the development and validation of 1) identified teaching competencies and skills for the subject area; 2) a blueprint which described the general weighting for each skill and the behavioral level for the actual test items; and finally, 3) the development of test items specifications from which the actual items would be written. Phase II involved the development, pilot testing and refinement of an initial 480 test items.

The following procedural description details the development of the subject area examinations for health education and physical education.

PHASE I PROCEDURES

In November of 1986, the College of Health and Human Performance at the University of Florida contracted with the Florida Department of Education to develop tests in the subject areas of Health Education K-12 and Physical Education Grades K-8 and 6-12. (Florida is among those states which endorse certification on two levels in Physical Education.) Identical procedures were followed by all subject area test development groups.

The initial task was to identify the competencies and skills necessary for beginning teachers in each subject area. In structuring this task, three general principles were adhered to:

1) experienced and informed subject area specialists would develop the lists of competencies and skills.
2) selected subject area specialists would include representatives of teacher educators, supervisors and practitioners, minority and union groups, professional organizations and all geographic regions of the state.
3) the competencies and skills identified by the development team would be job-related, relevant to successful training and measurable.

Two working committees were established to perform the necessary tasks--the Examination Development Committee and the Validation Committee. In determining membership on these committees, consideration was given to the three aforementioned

general principles and recommendations from the Florida Department of Education, professional organizations and the two teachers unions in the state.

Initially, the Examination Development Committee (EDC), composed of 11 members, was convened to discuss techniques for interviewing practitioners in the subject area and reviewing the literature. Open-ended interviews were to be conducted by the EDC to gather information about the competencies and skills which the practitioners believed were necessary for teaching in their subject area. The Department of Education (DOE) determined the number of interviews for each subject area based upon the number of teachers currently active in the field. The instrument was designed and standardized by the DOE for use in all subject areas. Team members were provided interviewing and recording instructions. Although the written instrument was designed to elicit general oral responses to questions, space was provided to allow for documentation of further comments by the interviewees. The categories for response were content knowledge, curriculum, instructional media, methods and strategies, evaluation, current trends, and classroom management.

The instrument and examples of categorical responses in the area of Physical Education are illustrated in Table 1. The completed interview forms were forwarded by the interviewers to the project director of the subject area for analysis.

Insert Table 1

The review of the literature was conducted by the EDC to identify competencies and skills which educational researchers, professional organizations or state departments of education had previously determined to be essential for teachers in their particular subject area. The scope of scholarly publications reviewed included current texts, professional journals, state designed curriculum frameworks, and state and national professional organizations' guidelines for educationally sound programming.

A subcommittee of the EDC consisting of the project director and two other EDC members comprised a Core Team which was primarily responsible for initial development and subsequent revisions of all documents produced. Using information gathered from the literature review, the analysis of the personal interviews and their own professional expertise, the Core Team developed the first draft of the competencies and skills to be addressed in the examinations.

The entire EDC was reconvened to review Draft One and to make recommendations for revisions. Every effort was made to encourage discussion and careful analysis of the identified

competencies and skills. Suggested changes were made, resulting in Draft Two.

The next step involved an internal review by the eleven-member Validation Committee, comprised primarily of practitioners. With the Core Team present to act in an advisory capacity, the Validation Committee reviewed each competency and skill and made suggestions for acceptance, deletion, or improvement. During this review the committee also determined if the identified skills could be measured in the multiple-choice test format designated by the DOE for the examinations.

Another charge of the Validation Committee was to recommend the weighting percentage each skill should receive on the completed examination form. Type or types of questions (recall, application, or problem-solving) which could best evaluate each skill were to be identified. From these discussions a preliminary blueprint for the examination was formulated. (An example of the Health Education blueprint for the competency area of Drugs/Alcohol/Tobacco is illustrated in Table 2.)

Insert Table 2

The blueprint consisted of an outline of the competencies and skills, the percent allocation for each of these on the examination form and a designation as to the type(s) of questions

to be used to evaluate each skill. Figures in the "Total" column represent the percentage of questions from the competency area to be included in the examination form. In the example presented in Table 2, 11% of the questions would be on Drugs/Alcohol/Tobacco.

Thus Draft Three of the competencies and skills and an initial blueprint based upon majority consensus was formed. After an editorial review by an outside source, the document was forwarded to the Department of Education for an external review.

The external review of the developed competencies and skills was conducted by the University of South Florida under a separate contract. Certified teachers, school-based administrators, county-level administrators, and college-level instructors were asked to complete a written survey instrument using a five-point scale, with "1" indicating no relation and "5" indicating a very high relation to the subject area. For each skill, survey the respondent was asked to judge four areas:

1) Job relatedness--the degree to which each skill is related to actual practice in this field.
2) Frequency of use--how often each skill is used in this field.
3) Importance for initial certification--value for a new teacher in this field.
4) Important for career achievement/advancement--value for a career teacher in this field.

Space was provided for survey participants to make additional

written comments, which were later considered by the Core Team in making adjustments to the list of competencies and skills.

All surveys were submitted for statistical analysis to the University of South Florida, the designated data coordination unit for all projects. Printouts were provided to the project directors for use with the Core Team in evaluating the results. The information from the external review validation served as the basis to modify the competencies and skills and to finalize the blueprint.

Based upon the statistical analysis, it was deemed appropriate to examine any item below a pre-determined acceptable mean value for deletion or revision consideration. It was further determined that the area "importance for initial certification" best complied with the purpose of this project, and therefore responses in this area were given the highest consideration in determining deletions or modification of skills. To illustrate, if a skill received a "low" value in terms of its relation to actual practice, but was rated "high" in importance for initial certification, the rating supported retention of the skill in this draft.

Using the comments and ratings from the survey, the Core Team further refined the blueprint to clearly reflect the importance of each skill as determined by the broad base of subject area professionals in the state who responded. Areas for potential changes identified by the Core Team were presented in

the form of Draft Four at a meeting of the Validation Committee. Each validation team member received a copy of the statistical analysis and comments. Each skill and Draft Four in its entirety was discussed and group consensus was obtained prior to any changes. This meeting resulted in the completion of Draft Five of the document.

Once all changes were made and validated, the competencies, skills and blueprints underwent a final editorial review, and plans were put into action to develop the test item specifications. All members of the EDC were sent lists of the various competency topics several weeks prior to the first specifications development meeting and requested to rank order the topics according to their perceived personal knowledge in each. Using the information provided from this self-ranking, individuals were assigned to competency areas in teams of two.

All committee members were provided with their writing assignments in advance and requested to bring any supportive materials to facilitate their task. General information about item specifications was also mailed out prior to the meeting. A training meeting on the development of test item specifications was conducted by the Department of Education personnel prior to beginning the task.

The purposes of developing item specifications were:

1) To provide an operational definition of each skill to be measured.

2) To serve as a guide for producing test items.

3) To ensure consistency among authors and over time.

The specifications were designed to serve as a guide in developing these and future examination items and forms to be used in the initial certification assessment process.

The item specifications included: identification of the skill; the "stimulus attributes", or information which poses the question; and the "response attributes", or information which presents the correct and incorrect foils (answer choices); and a sample item. Sufficient specificity in each item specification was needed to assure that the generated items would measure the skill. However, specifications also had to be sufficiently generic to enable several items to be developed from one specification.

Upon completion of the draft item specifications by the EDC, the Validation Team was convened to review each specification and suggest any changes to increase the usability of the item specification. The specifications were then reviewed by the test and measurements consultant and a professional copy editor.

PHASE II PROCEDURES

Phase II of the project involved the actual development of 480 test items (400 plus 20%). These items would compose the item bank for test forms of 125-150 questions each.

Again, two committees were organized, an Item Writing

Committee to write the actual test items and a Validation Committee to review and critique the test items. The first task was to identify committee members who were both knowledgeable in content and experienced in constructing psychometrically-sound test items. The Item Writing Committee was composed primarily of professionals involved in teacher preparation who were recognized content specialists. The Validation Committee was composed primarily of practitioners currently teaching in the field.

A training session on the specifics of item writing was conducted by a test and measurement consultant. Every effort was made to ensure that developed test items would be valid and reliable. Instruction included a review of the characteristics of good test items, how to use the item specifications, and how to construct or format items.

Because of the nature of the project a security plan was devised and each committee member was requested to sign a security agreement. All item development was conducted at one location with item writers working in teams of two. Any scrap materials were collected and shredded daily. All items developed each day were secured overnight and upon completion of test development by the responsible institution.

For pilot test purposes, items were distributed into five examination forms. The intent was to allow no individual to view and answer more than 100 of the test items. A DOE-designated number of senior-level students currently enrolled in teacher

preparation programs in the state of Florida or first-year teachers were asked to complete a test form in their area of specialization. Examinees were encouraged to react to the suitability and level of difficulty of the items by writing comments in the examination booklet. At the conclusion of the examination session, five students were randomly selected to respond orally to open-ended questions regarding the validity of the test.

The pilot tests were computer-scored and statistically analyzed by the Office of Instructional Resources at the University of Florida. Raw score analysis included the mean, median, mode, standard deviation and standard error of measurement based upon total group data. The Kuder-Richardson 20 reliability coefficient was used to determine test reliability. An analysis of functional distractors and indices of difficulty and discrimination indicated the difficulty of the items and the ability of the items to discriminate between better and poorer students. A point bi-serial correlation revealed the degree to which the items correlated to the total test score, indicating the items' consistency.

The project director reviewed the information obtained from the pilot test analysis, written comments, and personal interviews for the purpose of making recommendations for test item refinement by the Validation Team. "Reviewable items" were identified as those not falling within acceptable ranges in the

correlation analysis. The Validation Team met to review all test items and make further revisions based upon the available information and their professional expertise. After these suggested changes were made, the items were again reviewed by the test and measurement consultant and a professional copy editor.

Recommended changes by the test and measurement consultant and the copy editor were submitted for approval to the project director. Subsequently, the resultant items and the computer disks on which all items were stored were forwarded to the Department of Education.

The Florida Department of Education began administering the subject-area tests in the fall of 1988. Initially, tests administered during 1988 and 1989 were primarily used for the purpose of establishing normative data. Subject-area task forces were formed to review the data and determine passing scores for all subsequent administrations of the examinations.

RECOMMENDATIONS

The project was a monumental task requiring an in-depth look at our professions. The following recommendations are made to assist in the organization of future test development projects of this nature.

1. Timelines should be confirmed well in advance of the initiation of the phase and should allow sufficient time for form processing, typing, travel arrangements, and job demands

2. Secretarial assistance is critical to the success of a project of this magnitude. Consideration should be given to the demands during peak production times and additional clerical support should be provided.
3. Each phase should be completed prior to initiation of the next phase.
4. Summer months are not recommended for committee meeting dates due to vacations and other commitments.
5. Specification writers and item writers should be the same to provide continuity.
6. Phase I should incorporate development of competencies, skills and suggested blueprints. Phase II would then include specification writing, blueprint finalization and item development.
7. Understanding the total process and the mechanics of writing specifications and items would assist the Phase I committee members in developing competencies and skills.
8. The involvement of a measurement expert to conduct training sessions in sound examination preparation is recommended prior to specification writing.

TABLE 1
Interview Instrument

I. Content Knowledge	
Skill	Application
Demonstrate knowledge and understanding of child development.	Initial Cert.
II. Curriculum	
Skill	Application
Demonstrate knowledge of which sports and activities are appropriate for the grade level.	Initial Cert.
III. Instructional Media, Methods & Strategies	
Skill	Application
Demonstrate currency in knowledge of resources available in Physical Education.	Initial Cert.
IV. Evaluation	
Skill	Application
Utilize supportive data to determine grades and student progress.	Initial Cert.
V. Current Trends	
Skill	Application
Demonstrate knowledge of state mandates and their effect on the curriculum.	Initial Cert.
VI. Classroom Management	
Skill	Application
Demonstrate a knowledge of management skills to provide good class control.	Initial Cert.
VII. Other	
Skill	Application
Demonstrate a knowledge of budgetary procedures.	Initial Cert.

TABLE 2
Health Education Blueprint

Topic, Competency, Skill	REC*	APP*	PRS*	By Skill	Total Comp
VIII. Drugs/Alcohol/Tobacco					**11**
A. Effects on health	2	1	0	3	
B. Factors associated with substance use and abuse	1	1	0	2	
C. Socio-economic and legal consequences.	1	1	0	2	
D. Signs and symptoms of abuse.	2	0	0	2	
E. Prevention and control	1	1	0	2	